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Listing of Claims:

1.-20. (Deleted)

21. (Previously Presented) Nanocomposite materials photoluminescent in red visible light region and/or in infrared region at ambient temperature produced by a sol-gel process comprising:

- preparing an aqueous or hydroalcoholic mixture containing a silicon alkoxide, an additional component A, and an acidic catalyst, wherein the molar ratio between water molecules and silicon atoms is equal to or higher than 4;

- causing the mixture to gel thereby obtaining a wet gel;

- causing said wet gel to dry; and

- densifing the thus obtained dry gel by means of a thermal treatment having a maximum temperature from 1200°C to 1400°C; where

- the additional component A is a dialkyldialkoxysilane, R_2-Si-$(OR')_2$, or an alkyltrialkoxysilane, R-Si-$(OR')_3$, wherein R and R' radicals are not aromatic; and

- in the range from 300°C to 800 °C the thermal treatment is carried out under an atmosphere made up of pure HCl or a mixture containing at least 5% by volume of HCl in an inert gas, said atmosphere being anhydrous and not containing oxygen.

22. (Previously Presented) The nanocomposite materials according to Claim 21 wherein the silicon alkoxide is tetramethoxysilane or tetraethoxysilane.

23. (Previously Presented) The nanocomposite materials according to Claim 21 wherein the acidic catalyst is HCl.

24. (Previously Presented) The nanocomposite materials according to Claim 21 wherein the –R groups of the additional component A are selected from the group consisting of methyl, ethyl, propyl and butyl, and the –OR groups of the additional component A are selected from the group consisting of methoxy, ethoxy, propoxy and butoxy.

25. (Previously Presented) The nanocomposite materials according to Claim 24 wherein the additional component A is selected from the group consisting of methyltrimethoxysilane and methyltriethoxysilane.

26. (Previously Presented) The nanocomposite materials according to Claim 21 wherein the molar ratio between the silicon alkoxide and the additional component A is from 1.86 to 999.

27. (Previously Presented) The nanocomposite materials according to Claim 26 wherein said molar ratio is from 2.33 to 9.

28. (Previously Presented) The nanocomposite materials according to Claim 21 wherein pyrogenic silica is present.

29. (Previously Presented) The nanocomposite materials according to Claim 21 wherein gelation is obtained by raising the pH of the mixture.

30. (Previously Presented) The nanocomposite materials according to Claim 29 wherein raising the pH of the mixture is realized by adding a solution of ammonia.

31. (Previously Presented) The nanocomposite materials according to Claim 21 wherein sol gelation is obtained by raising the temperature to a value in the range of 40°C to 60°C.

32. (Previously Presented) The nanocomposite materials according to Claim 21 wherein drying of the wet gel is obtained by evaporation of liquid in pores of the gel.

33. (Previously Presented) The nanocomposite materials according to Claim 21 wherein drying of the wet gel is obtained by supercritical extraction of liquid in pores of the gel.

34. (Previously Presented) The nanocomposite materials according to Claim 23 wherein, before the supercritical extraction, the wet gel is subjected to an operation of exchange of liquid in pores of the gel.

35. (Previously Presented) The nanocomposite materials according to Claim 21 wherein the sol is deposited in form of a thin layer on a substrate by immersing the substrate in the sol and then extracting the substrate from the sol.

36. (Previously Presented) The nanocomposite materials according to Claim 21 wherein the sol is deposited in form of a thin layer on a substrate by depositing a drop of the sol on the substrate and rotating the substrate at high speed.

37. (Previously Presented) Supported thin layers of nanocomposite materials photoluminescent in red visible light region and/or in infrared region at ambient temperature produced by

- preparing an aqueous or hydroalcoholic mixture containing a silicon alkoxide, an additional component A, and an acidic catalyst, wherein the molar ratio between water molecules and silicon atoms is equal to or higher than 4;

- causing the mixture to gel thereby obtaining a wet gel;

- causing said wet gel to dry; and

- densifing the thus obtained dry gel by means of a thermal treatment having a maximum temperature from 1200°C to 1400°C; where

- the additional component A is a dialkyldialkoxysilane, R_2-Si-(OR')$_2$, or an alkyltrialkoxysilane, R-Si-(OR')$_3$, wherein R and R' radicals are not aromatic; and

- in the range from 300°C to 800 °C the thermal treatment is carried out under an atmosphere made up of pure HCl or a mixture containing at least 5% by volume of HCl in an inert gas, said atmosphere being anhydrous and not containing oxygen,

wherein the sol is deposited in form of a thin layer on a substrate by immersing the substrate in the sol and then extracting the substrate from the sol.

38. (Previously Presented)) Supported thin layers of nanocomposite materials photoluminescent in red visible light region and/or in infrared region at ambient temperature produced by

- preparing an aqueous or hydroalcoholic mixture containing a silicon alkoxide, an additional component A, and an acidic catalyst, wherein the molar ratio between water molecules and silicon atoms is equal to or higher than 4;

- causing the mixture to gel thereby obtaining a wet gel;

- causing said wet gel to dry; and

- densifing the thus obtained dry gel by means of a thermal treatment having a maximum temperature from 1200°C to 1400°C; where

- the additional component A is a dialkyldialkoxysilane, R_2-Si-$(OR')_2$, or an alkyltrialkoxysilane, R-Si-$(OR')_3$, wherein R and R' radicals are not aromatic; and

- in the range from 300°C to 800°C the thermal treatment is carried out under an atmosphere made up of pure HCl or a mixture containing at least 5% by volume of HCl in an inert gas, said atmosphere being anhydrous and not containing oxygen,

wherein the sol is deposited in form of a thin layer on a substrate by depositing a drop of the sol on the substrate and rotating the substrate at high speed.

39. (Previously Presented) Nanocomposite materials having photoluminescence in red visible light region and/or in infrared region at ambient temperature.

40. (Previously Presented) Nanocomposite materials of Claim 39 having photoluminescence at wavelength at least 780 nm.

41. (Previously Presented) Nanocomposite materials of Claim 39 having photoluminescence centered at 9,570; 8,680 and 7,500 cm-1.

42. (Previously Presented) Nanocomposite materials of Claim 39 having emission intensity according to Figure 2.

43. (Previously Presented) Nanocomposite materials of Claim 39 comprising elemental silicon.

44. (Previously Presented) Nanocomposite materials of Claim 39 comprising silica.

45. (Previously Presented) Nanocomposite materials of Claim 39 which absorb infrared light at lower than 2,000 cm-1.

46. (Previously Presented) Nanocomposite materials of Claim 39 which absorb infrared light at higher than 10,000 cm-1.

47. (Previously Presented) Nanocomposite materials of Claim 39 which absorb infrared light as illustrated in Figure 1.